Running head: CHILD HEALTH IN APPALACHIA

Parent and Child Health in Appalachia Ohio: A Geographical Comparison

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Table of Contents

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Abstract

Interpersonal and extra-personal factors such as one's family health behaviors, lower educational levels, and lack of pediatric health care resources place children living within Appalachia Ohio at increased risk for environmental exposures that lead to poor health outcomes. The purpose of this study was to examine the impact of parent health and behaviors on child health in 3 designated sub-regions of Appalachia Ohio: East Central, South East, and Southern. Specific aims were to determine if parent health was related to child diabetes and if parent smoking status was related to child asthma. This study was a secondary data analysis of the 2008 Ohio Family Health Survey (OFHS), which was a statewide random digit dial telephone survey of over 50,000 Ohio residents. Survey respondents were parents describing own health and their child's health. The sample was 2954 un-weighted parent-child pairs residing in one of Ohio's 29 Appalachian counties. A subset of data was utilized from the Parent Health and Child Health Questionnaires. Data were analyzed by descriptive inferential statistics, correlations, and ANOVA for group comparisons. Results show that parent BMI was not related to child diabetes ($r = -.030$) and child BMI was not related to child diabetes ($r = .001$). Parent smoking status was not related to the prevalence of child asthma ($r = -.027$). In all regions, child diabetes was positively related to child asthma ($r = .074$). Parent smoking prevalence was also related to severity of childhood asthma ($r = .286$). Differences were found based on sub-region. Children with the highest BMI resided in the South East sub-region ($F = 3.51$, $p = .03$). This study suggests challenges to healthy living may differ within Appalachia. Family-based and tailored community-level interventions are needed to improve health outcomes of children residing in Appalachia Ohio.

Chapter I: Introduction and Background

The Appalachian region of the United States covers 200,000 square miles spanning thirteen states from New York to South Carolina. Twenty-three million people, residing in 410 counties, are Appalachian; forty-two percent of Appalachian counties are designated as rural areas (Casto et al., 2009). Appalachia Ohio consists of twenty-nine counties of which most are designated as rural (Smith, 2009). Within Ohio, three geographical sub-regions of Appalachia are recognized: East Central, South East, and Southern. Characterized by persistent poverty and low educational attainment, Appalachia has been considered a distinct cultural region with core cultural values for over a century (Smith & Tessaro, 2005).

Appalachia's core cultural values include individualism, self-reliance, traditionalism, and fatalism (Smith & Tessaro, 2005). Appalachians place importance on family, religion, and kinship. Not surprisingly these cultural values relate to the health and illness needs of residents in this region (Denham, Meyer, & Toborg, 2004). Practices such as self-management of illnesses and isolation become barriers to the utilization of formal health resources by Appalachians (Smith & Tessaro, 2005; Posey, 2006). According to Casto et al. (2009), this leads to lack of health education and risky lifestyle behaviors such as poor eating habits, smoking, alcohol, consumption, and sedentary lifestyle. Additionally, Appalachian residents are at elevated risk for obesity, cardiovascular disease, and cancer and have the third highest premature death rate in the United States (Hortz, Stevens, Holden, & Petosa, 2009). These poor health outcomes may result from the combination of poor lifestyle behaviors, environmental factors, and cultural norms. Within Appalachia Ohio, lifestyle behaviors such as poor nutrition, smoking, alcohol consumption, and sedentary lifestyle may be the underlying cause for the

higher rates of obesity, diabetes, and other related illnesses, when compared to the rest of Ohio (Casto, et al., 2009; Tulkki, et al., 2006).

Children and adolescents residing in Appalachia Ohio are not immune to the poor health outcomes associated with cultural practices. Cultural practices may influence parent's utilization of formal health resources for their children, parental support for children to engage in health behaviors, and the exposure to poor lifestyle behaviors. For example, the social norms of poor eating habits such as eating fewer fruits and vegetables coupled with sedentary behaviors and higher smoking prevalence among adults in Appalachia contribute to higher rates of adolescent obesity and asthma within Appalachia regions (Williams, Taylor, Wolf, Lawson, & Crespo, 2008; Vork, Broadwin, & Blaisdell, 2007; Ahijevych, 2003). Not surprisingly, youth residing in rural Appalachian areas have the highest rates of obesity, compared to children and adolescents residing urban or other rural areas (OFHS, 2009).

Adolescent obesity is associated with co-morbidities such as diabetes, cardiovascular disease, and cancers occurring in both in adolescence and adulthood (Williams, Taylor, Wolf, Lawson, & Crespo, 2008). For example, adolescents residing in Appalachia West Virginia have the 2nd highest obesity rate in the United States and Huntington West Virginia is considered the "fattest" city in the United States (Williams, Taylor, Wolf, Lawson, & Crespo, 2008). Furthermore, recent studies have shown that the youth in Appalachia Ohio consume diets with a greater caloric intake, high in fatty and sugary foods and low in fruits and vegetables (Tulkki et al., 2006). These poor lifestyle behaviors, accepted as cultural norms, result in poor health outcomes both during childhood and tracking into adulthood.

Smoking prevalence in Appalachia Ohio is disproportionately higher (30%) compared to Ohio (Ahijevych, 2003). Tobacco growing is an economic industry in rural Appalachia and thus

the use of tobacco products including cigarette use may be more culturally acceptable. However, the increased smoking prevalence rates may be contributing to the disproportionate occurrence of asthma in children and increased symptomatology of childhood and adolescent asthma (Smith & Tessaro, 2005). In children, second hand smoke exposure has been consistently linked to asthma and severity of asthma symptoms (Vork, Broadwin, & Blaisdell, 2007).

Due to the greater prevalence of obesity and obesity-associated comorbidities resulting from poor nutrition and sedentary lifestyle in Appalachia, the need for health promoting interventions targeting children and adolescents is urgent. Successful interventions may impact the prevalence of childhood obesity and ultimately the development of comorbidities such as early onset diabetes and cardiovascular disease (Wu et al., 2009). Similarly, poor health outcomes are also associated with smoking patterns. Higher smoking prevalence rates found in Appalachia have been linked to increased rates of lung and oral cancer found in Appalachian regions (Lengerich et al., 2005; Casto et al., 2009). Additionally, studies show that parental smoking is a strong predictor of smoking in youth (Denham, Meyer, & Toborg, 2004). As a result, the influence of family and family lifestyle behaviors become important factors in understanding child health outcomes.

Parents and other close relatives serve as initiator, prompter, accomplice, and inadvertent source of cigarettes to adolescents (Denham, Meyer, & Toborg, 2004). Household second hand smoke exposure has been consistently linked to the development of childhood asthma (Vork, Broadwin, & Blaisdell, 2007). Therefore, similar to interventions targeting childhood obesity, smoking cessation interventions need to be family-focused and factually oriented to educate adults and adolescents about the risks of smoking in a culturally acceptable manner (Smith & Tessaro, 2005).

In regards to childhood obesity, it has been found that most Appalachian adolescents perceive that significant others are not healthy eaters. Perceptions of healthy eating habits of parents and higher social support for healthy eating are both associated with healthier eating habits. This suggests that perceived social norms and the lack of social support for healthy eating play an important role in determining rural adolescents' eating habits (Wu et al., 2007).

The purpose of this study is to examine the impact of parent health and parent health behaviors on child health in Appalachia Ohio, specifically it is important to explore whether parent health and health behaviors have an impact on current child health. Understanding the underlying causes of child and adolescent health in rural Appalachia will assist practitioners to develop culturally appropriate guidelines and interventions aimed at improving health outcomes in a disadvantaged and understudied area. The specific aims include:

Specific Aim 1: To determine if parent health is related to childhood diabetes.

H1a: Children of parents in poorer health will have higher rates of diabetes.

H1b: Children with diabetes will have higher a Body Mass Index

RQ1a: Are there differences in childhood health based on the sub region within Appalachia Ohio?

Specific Aim 2: To determine if parent smoking status impacts child health.

H2a: Children of parents who smoke will have higher rates of asthma.

H2b: Children with asthma of parents who smoke will experience a greater severity of asthmatic symptoms, compared to asthmatic children with non-smoking parents.

RQ2a: Are there differences in the prevalence of childhood asthma based on the sub-region within Appalachia Ohio?

RQ2b: Are there differences in adult smoking prevalence based on the sub-region within Appalachia Ohio?

To conduct a literature review, the online citation index databases CINAHL and Cochrane Review were utilized. Keywords to find articles included: Appalachia, rural, adolescent health, obesity, diabetes, smoking, and asthma. Years of publication include 2000 ans 2003-2010. Twenty-two articles of interest were identified and reviewed. One recurrent theme emerged: geographic location and cultural norms are related to poor lifestyle behaviors. Also, these behaviors may be contributing to a higher prevalence of chronic disease such as diabetes and obesity found in Appalachian regions. The following review of literature focuses on four variables of interest: obesity, diabetes mellitus, adult smoking, and childhood asthma.

Obesity

In the United States, 66% of adults are classified as either overweight or obese. It is projected that if current trends continue, 75% of adults will be classified as either overweight or obese within the next five years (Wang & Beydoun, 2007). Adolescent obesity is a crucial health concern because being overweight during adolescence can persist into adulthood, increasing the risk for chronic diseases like diabetes and heart disease (Wu et al., 2009). Nationwide, 34% of children and adolescents are currently classified as overweight and another 16% are classified as obese (Wang & Beydoun, 2007). Specific to this study, children and adolescents residing in rural Appalachian regions have higher obesity prevalence rates compared to children and adolescents living in urban areas (Wu, et al., 2007; Tulkki, et al., 2006; Schetzina, et al., 2009). Cultural factors and social norms are possible underlying causes of high rates of child and adolescent obesity in Appalachia (Tulkki et al., 2006; Hortz et al., 2009). There is greater social acceptance of higher Body Mass Index and decreased knowledge of the

true causes of obesity. For example, Appalachian adolescents have reported that lifestyle behaviors did not contribute to a healthy weight in most cases, believing weight was dependent on genetics (Williams, Taylor, Wolf, Lawson, & Crespo, 2008). Furthermore, Wu et al., (2007) found that most Appalachian adolescents claim that importance is not placed on eating healthy and perceive family and friends as not healthy. Results from this study reveal that the perception of parents being healthy eaters and a higher level of social support are associated with better adolescent eating habits.

Numerous studies support the impact of nutritional habits and physical activity on adolescent obesity within Appalachia. Rural Appalachian children practice poor nutritional habits by consuming a diet high in fatty and sugary foods and low in fruits and vegetables (Tulkki, 2006). Furthermore, Hortz, Stevens, Holden, & Petosa (2009) found that Appalachia is the most sedentary population in the nation and that only 5% of Appalachian children in their study participated in the recommended sixty minutes if daily moderate physical activity.

In summary, the literature suggests that the Appalachian population has significantly higher obesity rates compared to national averages. Appalachian youth are influenced by parent and community practices of physical activity and nutritional intake. How influential parent weight is on child weight has yet to be determined. In addition to a rise in the prevalence of adolescent obesity, there has also been a rise in the presence of type II diabetes mellitus in children and adolescents (Libman & Arslanian, 2007).

Diabetes Mellitus

Type II diabetes mellitus has many genetic and environmental risk factors including obesity, sedentary lifestyle, family history, and an insulin resistance phenotype (Srinivasan, 2003). Adults and youth residing in Appalachia Ohio commonly display one or more of these

risk factors (Libman & Arslanian, 2007). Due to the strong genetic and familial component of diabetes mellitus, studies have been conducted looking at child health as it relates to parental diabetes. Results show that children with at least one diabetic parent consistently have a higher childhood BMI, higher fasting insulin levels, and higher fasting glucose levels during adolescence (Srinivasan, Frontini, & Berenson, 2003). In adulthood, children with at least one diabetic parent had higher triglyceride levels and higher LDL cholesterol levels, and lower HDL cholesterol levels (Srinivasan, et al., 2003). Atherosclerosis, often beginning in adolescence, is associated with these laboratory patterns including increased LDL cholesterol levels and decreased HDL cholesterol levels as well as hypertension and BMI (Dahl-Jorgensen, Larsen, & Hanseen, 2005). In regards to environmental factors, poor adolescent eating habits may negatively impact adolescent cholesterol and BMI. Family promotion of poor eating habits can increase the risk of higher BMI and consequently Type II diabetes mellitus.

Ohio Appalachians are at high-risk to develop early onset diabetes, type II diabetes and their co-morbid conditions due to the disproportionately high rates of obesity and poor lifestyle behaviors such as sedentary activities in youth (Wu et al., 2009). Prevention and intervention strategies need to shift their focus to environmental change involving families, schools, and food industries to help reverse socioeconomic practices that promote obesity and poor health in rural areas, especially in Appalachian regions (Libman & Arslanian, 2007).

Adult Smoking

Cigarette smoking rates are disproportionately high in Appalachia. Compared to Ohio's prevalence rate of 25%, the adult smoking rates exceed 30% in the Appalachian region (Ahijevych et al., 2003). Since tobacco cultivation is an economic base, cigarette smoking is most prevalent in the rural tobacco growing regions of southern Appalachia (Ahijevych et al.,

2003). Increased prevalence and acceptance of cigarette smoking in Appalachia raises health concerns and can not be ignored when planning health education interventions.

Smoking results in poor health outcomes not only for the smoker but also for those exposed to second hand smoke. Smoking is a risk factor associated with increased lung cancer, oral cancer, and heart disease, which occur at higher rates in some regions of Appalachia (Lengerich et al., 2005; Casto et al., 2009). Despite these statistics, Appalachians are less likely to be concerned with the risks associated with smoking (Denham, Meyer, & Toborg, 2004). Family plays a central role in the increased acceptance and early experimentation of smoking by Appalachian adolescents with parent smoking being a strong predictor of smoking in youth (Myer, Toborg, & Mande, 2008; Denham, Meyer, & Toborg, 2004). Smoking cessation is important in health promotion and education within Appalachia, but may require tailored interventions to fit the population's cultural and personal needs (Ahijevych et al., 2003). Although studies have been conducted looking at parent smoking and its influence on adolescent smoking, the influence of parent smoking on child health, more specifically childhood asthma, has yet to be determined. One childhood illness often linked to parent smoking habits is childhood asthma.

Childhood Asthma

Asthma is the most common chronic childhood illness in the United States and disproportionately affects minority, low-income, and rural children (Pesek et al., 2010). In recent studies, rural children were more likely to display symptoms of moderate to severe asthma than urban children. This includes higher prevalence of trouble breathing, recurrent cough, recurrent chest tightness, and repeated episodes of bronchitis (Pesek et al., 2010). As a result, asthma in rural children is thought to be under diagnosed and inadequately treated.

It is well known that environmental household tobacco smoke is a risk factor in the development of childhood asthma and can exacerbate already established childhood asthma (Vork, Broadwin, & Blaisdell, 2007; Gold, 2000). Gold found a consistent relationship between environmental tobacco smoke and the development of newly diagnosed asthma as well as increased prevalence of asthma in children less than 6 years old (2000). The influence of environmental tobacco smoke on older children is yet to be determined. Although much is known about childhood asthma in early childhood, less is known about older asthmatic children. Since most research has focused on asthmatic children living in urban areas, less is known about children residing in more isolated or rural areas like Appalachia. It is not known if unique risk factors related to parent smoking, asthma severity, and the household environment may impact asthma prevalence and morbidity among rural Appalachian children.

Chapter II: Methods

This correlational study was a secondary data analysis of the 2008 Ohio Family Health Survey (OFHS). The purpose of the data analysis was to compare parent health to child health in three designated sub-regions in Appalachia Ohio and to determine if differences between the health of both parent and child based on geography exist. The OFHS survey was a statewide, random digit dial telephone survey of over 50,000 Ohio residents (OFHS, 2008). The survey was sponsored by the Ohio Departments of Insurance, Job and Family Services, Health, and Mental Health to inform state and local policy makers concerning the impact of health care reform strategies on the State of Ohio and its citizens. A subset of data was analyzed from the larger survey that includes the counties of interest and population of interest. Seven questions were extracted from the OFHS Child Survey Instrument Section L: Health Status of Child and nine questions were utilized from the OFHS Adult Survey Instrument Section D: Adult Health Status

& Care Giving. These questions are considered reliable and valid because they have been asked in previous the OFHS surveys from 1998 and 2004 and widely used in family-based studies.

All survey responses were obtained from parent-child pairs with parent respondents describing their own health and their child's health. Parent respondents answered the child questionnaire for only the oldest child in the household. Child was defined as someone under the age of 18 years old (OFHS, 2008). Parent was defined as either the mother or father of chosen child. Parent demographics included gender and ethnicity. Child demographics included age, gender, and ethnicity.

Child health. Child health was measured by the parents' general perception of child health ranging from "poor" to "excellent." Parents were asked "In general, how would you describe your child's health? Would you say [his/her] health is excellent, very good, good, fair, or poor?" Child health was also measured by calculated BMI obtained on children aged 10-17 years. Parents were asked "How tall is your child now?" Responses were recorded in feet {range 3-6}, inches {range 0-11}, and centimeters {range 91-211}. Parents were asked "How much does your child weigh now?" Responses were recorded in pounds {range 40-500} and kilograms {range 88-227}.

Parent health. Parent health was measured by the parents' general perception of own health ranging from "poor" to "excellent." Parents were asked "In general, would you say your health is excellent, very good, good, fair, or poor?" Parent health was also measured by calculated BMI obtained for all 2954 adult respondents. Parents were asked "About how much do you weigh without shoes?" Responses were recorded in pounds and kilograms. The upper limit for pounds was 700lbs, and upper limit for kg was 318kg. Parents were asked "About how tall are you without shoes." Responses were recorded in feet, inches, and centimeters.

Parent health was also measured by the parents' perception of prevalence and control of own diabetes mellitus. Parents were asked "Have you ever been told by a doctor or any other health professional that you had type 1 child onset diabetes or type 2 adult onset diabetes." Responses were recorded as yes, "gestational" or "only when pregnant," yes - type I (juvenile), yes - type II (adult onset), borderline diagnosis only, and no, never diagnosed with diabetes. Those parents who responded yes to the above question were asked "Is your blood sugar or glucose level, which affects diabetes, usually under control or where a physician wants it, even if medication is required always, usually, sometimes, rarely, or never?"

Childhood diabetes. Childhood diabetes was measured by the parents' perception of prevalence and severity of their child's diabetes. Parents were asked "Does your child currently have diabetes?" Responses were recorded as yes or no. Parents were also asked "Would you describe (his/her) diabetes as mild, moderate, or severe?" Responses were recorded as mild, moderate, or severe.

Childhood asthma. Childhood asthma was measured by the parents' perception of prevalence and severity of their child's asthma. Parents were asked "Does your child currently have asthma?" Responses were recorded as yes or no. Parents were also asked "Would you describe (his/her) asthma as mild, moderate, or severe?" Responses were recorded as mild, moderate, or severe.

Parent smoking. Parent smoking habits were measured by the parents' perception of own rate of smoking and household rules about smoking. Parents were asked "Have you smoked at least 100 cigarettes in your entire life?" Responses were recorded as yes or no. Those parents who responded yes to the above question were asked "Do you smoke cigarettes every day, some days, or not at all?' Responses were recorded as every day, some days, or not at all. Parents were then

asked "Which statement best describes the rules about smoking inside your home? Do not include decks, garages, or porches. Would you say smoking is not allowed anywhere inside your home, or smoking is allowed some places or at some times, or smoking is allowed anywhere inside your home?" Responses were recorded as not allowed anywhere inside home, some places or at some times, or allowed anywhere.

The inclusion criteria for this study were residents currently residing within the federally designated Appalachian counties of Ohio. The 29 counties are divided into East Central, South East, and Southern. See Table 1 for counties included and sample number from the 3 sub-regions. All counties not federally designated as Appalachian at the time of data collection were excluded from this study. Only biological parent-child pairs were included. The un-weighted sample size that met the inclusion criteria was 2954 children and their biological parent. The sample was de-identified by the survey Principal Investigator. To achieve the specific aims of this study, descriptive inferential statistics, Spearman Rank and Pearson correlations, and ANOVA for group differences were conducted. For questions with yes or no in the answer, Spearman Rank correlations were used to determine significant relationships. For questions with continuous answers on a scale, Pearson correlations were used.

Chapter III: Results

Weighted values were applied to all variables using Weight_A and Weight_C variables calculated and provided by the OFHS Principal Investigator. These weighted values are reflected in the following text and tables. See Table 2 for demographic information. Most children and parents are White (Caucasian) with the majority of parent respondents being mothers. Children were equally split by gender. The mean age of the children is 9.12 (SD = 5.23).

Child Health

Almost 60% of parents consider their child to be in excellent health. Only 0.1% of parents reported their child to be in poor health. However, nearly 37% of children were above normal weight with 14.4% classified as overweight and another 22.3% of children classified obese. Only 0.6% of parents reported that child currently has diabetes. For children with diabetes, most parents (59%) report its severity as moderate. Childhood asthma was more prevalent compared to childhood diabetes with 15.9% of parents reporting that a health professional has told them their child has or had asthma and 10.5% of parents reporting that their child currently has asthma. Approximately 60% of parents reported their child's asthma as mild, 36% of parents describe their child's asthma as moderate, and only 3.1% of parents described their child's asthma as severe.

Parent Health

Over half of parents considered themselves to be in very good or excellent health while 17% of parents reported their health to be either fair or poor. Most parents considered themselves to be presently healthy with 59.6% saying that over the last 30 days they have had 0 days where their health is not good. Nearly 60% of parents were above normal weight with 28.3% of parents classified as overweight and another 29.8% of parents classified as obese.

Hypertension and diabetes were reported as consistent chronic health conditions for parents with 19.4% reporting a diagnosis of high blood pressure and 10% reporting that they have been told by a medical professional that they have diabetes. Half of parents with a diagnosis of diabetes state that it was type II or adult-onset. Only 31.7% of diabetic parents said that their blood sugar was always under control, 9.3% said that it was rarely controlled, and 14.3% reported that it was never under control. There was a high prevalence of smoking among

parents with 53.8% of parents saying they had smoked at least 100 cigarettes in their life and 56% of parents reporting smoking daily. More than 10% of parents reported that smoking was allowed anywhere in their home and another15.1% of parents reported that smoking was allowed in some places and at some times in the home.

Specific Aim 1: To determine if parent health is related to childhood diabetes

There was no statistically significant correlation between parent BMI and prevalence of childhood diabetes (r = -.030). There was no statistically significant relationship between child BMI and childhood diabetes (r = .001). See Table 3 and 4 for correlational results. Differences were found in parent health and child health based on Appalachia geographic sub-region (F = 2.47, p = .09 and F = 1.26, p = 0.29). Differences were also found in child BMI based on Appalachia geographic sub-region (F = 3.52, p = .03). Child obesity rates were highest in the South East region at 25.3% compared to East Central at 20.3%, Southern at 19.9%, and all of Appalachia Ohio at 22.3%. The South East region also has a significantly higher mean child BMI (23.4%) and mode BMI (23.3%) compared to the other sub-regions. The Southern region had the lowest childhood obesity rates at 19.9% and the highest rates of underweight at 4.9%. See Table 5 for child and parent health findings based on geographic sub-region. Parent BMI was highest in the Southeast region with 35.3% of parents classified as obese compared to East Central (32.8%), Southern (33.1%), and all of Appalachia (31.9%). The mean parent BMI is highest in Southeast region at 28.64.

Spearman Rank Correlations revealed that there was no statistically significant relationship between parent body mass index and prevalence of child diabetes is (r = -.030). Additionally, there was no statistically significant relationship between child body mass index and prevalence of childhood diabetes (r = .001). Spearman Rank Correlations revealed that there

was a statistically significant positive correlation between prevalence of childhood diabetes and prevalence of childhood asthma (r = .074).

Specific Aim 2: To determine if parent smoking status impacts child health.

There was no statistically significant relationship between prevalence of parent smoking and prevalence of child asthma (r = -.027). There is a statistically significant relationship between prevalence of parent smoking and severity of child asthma (r = .286). Differences in prevalence of child asthma between sub-regions were not significant. There were no group differences in prevalence or severity of childhood asthma based on Appalachian sub-region (F = .321, p = .726).

Chapter IV: Discussion

Child health in the distinct cultural and geographic region of Appalachia Ohio is impacted by many social and environmental factors. Due to the fact that Appalachians place importance on self-reliance and self-management, children are at risk for decreased utilization of healthcare services (Smith & Tessaro, 2005; Posey, 2006). Common Appalachian lifestyle practices such as poor nutrition, sedentary behaviors, smoking, and alcohol consumption place children at risk for poor health outcomes (Casto et al., 2009; Tulkki, et al, 2009) Lack of education, persistent poverty, and decreased access to health care facilities within the 29 counties of Appalachia Ohio is also related to child health (OFHS, 2008).

Parent and child health in Appalachia Ohio is poorer when compared to the rest of Ohio. Over 67% of adults residing in Appalachia are considered overweight or obese, a rate higher than rest of Ohio and national estimates. More than 36% of children aged 10-17 residing in Appalachia are considered overweight or obese, exceeding state and national estimates (OFHS, 2008). Recently the Ohio Department of Health estimated that over 40% of third graders

residing in 16 of Ohio's Appalachian counties are either overweight or obese (Oza-Frank, Norton, Scarpitti, Wapner, & Conrey, 2011).

Despite overweight and obesity trends, most parents reported that they and their children are in good or excellent health. This may indicate a general lack of knowledge about healthy weight and its impact on overall health or healthy lifestyles within Appalachia. One common co-morbid condition associated with obesity is diabetes mellitus. However, less than 1% of parents reported that their child currently has diabetes. This may be a result of undiagnosed and therefore untreated childhood diabetes within the region. Another explanation may be that diabetic children have type I diabetes, which is commonly diagnosed in childhood. Type I diabetes is not necessarily associated with weight and BMI as it is with type II diabetes. The children of parents in poorer health were not more likely to have a diagnosis of diabetes. Also, children with diabetes did not have a higher BMI which is consistent with Type 1 diabetes. It should also be noted that the questionnaire used for this study did not specify between type I and type II diabetes in the possible responses.

Child health did differ between the three distinct geographic sub-regions of Appalachia Ohio: East Central, South East, and Southern. The highest rates of childhood overweight and obesity were found in the South East region. Similarly, the highest mean child BMI was found in this region. The South East region of Appalachia Ohio is known for persistent poverty and lower educational levels. Other environmental factors that may partially explain this finding is the economic base and transient living conditions prevalent in this sub region. Given thes environmental factors, it is thought that many children lack adequate and consistent nutritional education and opportunities for regular physical activity. However, this finding is not well understood and required further investigation. It is noteworthy, that many counties within this

South East region border West Virginia, the only state classified at entirely Appalachian. Adolescents residing in Appalachia West Virginia have the 2nd highest obesity rate in the U.S.(ref) and Huntington West Virginia is considered one of the "fattest" cities in the United States. Huntington West Virginia borders the Ohio River and Ohio's Appalachian counties in the South East Region.

Smoking rates in Appalachia Ohio are significantly higher when compared to Ohio. Because tobacco is an established economic industry in this rural Ohio region, cigarette smoking is more socially acceptable and thus more prevalent in the tobacco growing regions, especially the Southern region of Appalachia. Over half of parents reported that they smoke cigarettes everyday and over a quarter of these parents reported that they allow smoking anywhere or in some places in their home. Second hand tobacco smoke is known to be a risk factor for the development of childhood asthma and can exacerbate already established childhood asthma (Vork, Broadwin, & Blaisdell, 2007; Gold, 2000).

Surprisingly, children of parents who smoke did not have higher rates of asthma. Presence of second hand smoke in the home did not impact whether or not a child was diagnosed with asthma in while in childhood. However, as the prevalence of parent smoking increased the severity of reported asthma symptoms in children diagnosed with asthma increased. This indicates that the presence of second hand smoke in the home has the potential to exacerbate and worsen symptoms of already diagnosed childhood asthma. Therefore, the high prevalence of parent smoking may be the reason that over 40% of asthmatic children have moderate or severe asthma. Childhood asthma rates and parent smoking rates did not differ between the three geographic sub-regions.

Given the public health concerns surrounding childhood obesity trends, co-morbid

conditions among children are receiving increased attention among researchers and practitioners. My study supports this concern because there was a positive correlation between the prevalence of childhood diabetes and prevalence of childhood asthma. Having diabetes in childhood may adversely affect growth, development, and healing. Poor health practices and outcomes in childhood potentially lead to poor health and higher risk for chronic diseases likes diabetes and cardiovascular disease in adulthood. The presence of asthma impacts quality of life. Children and adults with moderate to severe asthma are often required to make lifestyle changes due to the fact that asthma symptoms put limitations on overall activity and functioning.

Chapter V: Limitations

This study has several limitations. By using the 2008 OFHS data, the study relies on the perceptions of parent respondents to draw conclusions about parent and child health status within Appalachia Ohio. Though perceived health status is an important factor when investigating Appalachian health, actual health measures and height/weight measures were not collected. Also it should be noted that the data were collected from a telephone interviews instead of in person or in home interviews. Telephone interviews tend to be less personal with respondents less likely to tell the truth and give full attention.

One limitation found in the study's sample is the fact that the number of respondents varies greatly by county ranging from 1 respondent to 167 respondents for a single county. Therefore, respondents' responses may not be representative of the county. The question asking about the prevalence of child diabetes does not specify between type 1 and type 11 diabetes mellitus. Therefore, findings from this data are only telling of the presence and severity of diabetes in general. Conclusions should not be drawn about type 11 diabetes which is more closely associated with weight and nutritional practices.

Chapter VI: Conclusion

By conducting this secondary data analysis of the 2008 Ohio Family Health Survey, important health trends were found within the 29 counties of rural Appalachia Ohio. This distinct cultural region experiences multiple barriers to receiving adequate health care and health education. As a result, children and adults residing in Appalachia are at higher risk for practicing risky lifestyle behaviors and experiencing poor health outcomes. Although major statistical results were not found for all health variables investigated, some key findings were found. The Appalachian population is significantly more overweight and obese when compared to the rest of Ohio. There are high rates of smoking in adults and high rates of moderate and severe asthma in children. Adult smoking had a positive correlation with increased severity of asthma symptoms in children. Also, co-morbidities were found in children with prevalence of diabetes having a positive correlation with asthma. This geographical area and factors impacting its population's health are often understudied and under-researched. From the study's findings, researchers and health care providers have the ability to tailor health promotion interventions to fit the unique cultural needs of Appalachian Ohioans.

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Table 1: Un-weighted Sample from Three Geographical Sub-Regions Divided by County

East Central	n	South East	n	Southern	n
Belmont	13	Athens	9	Adams	1
Carrol	19	Hocking	73	Brown	15
Columbiana	29	Meigs	105	Clermont	25
Coshocton	31	Monroe	111	Gallia	53
Guernsey	59	Morgan	115	Highland	71
Harrison	67	Noble	121	Jackson	79
Holmes	75	Perry	127	Lawrence	87
Jefferson	81	Washington	167	Pike	131
Muskingum	119			Ross	141
Tuscarawas	157			Scioto	145
				Vinton	163

Table 2: Demographics- Appalachia

Demographics	Appalachia
Child	
Age	
Mean	9.12
SD	5.23
Gender (%)	
Male	49.6
Female	50.4
Ethnicity (%)	
White/Other	95.0
Black	1.9
Hispanic	2.3
Asian	0.8
Parent/Guardian	
Gender (%)	
Male	1.6
Female	98.4
Ethnicity (%)	
White/Other	95.7
Black	1.6
Hispanic	1.9
Asian	0.9

Table 3: Correlations Between Diabetes Variables

	Does the child currently have diabetes?	Would you describe the child's diabetes as mild, moderate, or severe?
Parent Body Mass Index	-0.030	-0.395
Child Body Mass Index	0.001	-0.251
Does the child currently have asthma?	0.074	0.104

Table 4: Correlations Between Asthma Variables

	Does the child currently have asthma?	Would you describe the child's asthma as mild, moderate, or severe?
Do you smoke cigarettes every day, some days, or not at all?	-0.027	0.286
Have you smoked at least 100 cigarettes in your entire life?	0.016	0.033
Parent Body Mass Index	0.083	-0.008

Table 5: Frequencies Between Appalachia, East Central, South East, Southern Regions

Child Health Status	Appalachia	East Central	South East	Southern
Perceived General Health (%)				
Excellent	56.2	56.4	56.3	56.2
Very Good	27.3	28.1	27.5	30.2
Good	12.6	12.2	13.3	10.8
Fair	3.7	2.6	2.8	2.5
Poor	0.1	0.5	0.2	0.3
Don't Know/Refused	0.1	0.2	0.0	0.1
Body Mass Index (%)				
Underweight	4.6	4.0	3.4	4.9
Normal weight	58.7	58.1	57.0	55.5
Overweight	14.4	17.6	14.3	19.7
Obese	22.3	20.3	25.3	19.9
Body Mass Index				
Mean	22.57	22.25	23.26	22.47
Median	21.53	21.03	21.59	21.84
Mode	18.94	21.03	23.32	20.67
Parent Health Status				
Perceived General Health (%)				
Excellent	17.0	15.0	12.8	13.7
Very Good	37.0	31.7	30.0	28.2
Good	28.9	29.6	30.4	28.9
Fair	13.3	17.1	19.3	19.3
Poor	3.7	6.3	7.3	9.5
Don't Know/Refused	0.1	0.4	0.2	0.5
Body Mass Index (%)				
Underweight	2.3	1.5	2.3	2.0
Normal weight	31.5	30.8	28.3	29.6
Overweight	34.4	34.9	34.1	35.4
Obese	31.9	32.8	35.3	33.1
Body Mass Index				
Mean	28.52	28.43	28.64	28.52
Median	27.43	27.42	27.46	27.40
Mode	25.78	28.22	32.28	27.40

Table 6: One-way ANOVA for East Central, South East, and Southern Sub-Regions

ANOVA	F	Significance
Child Health Status		
Would you describe child's health as excellent, very good, good, fair, or poor?	1.259	0.284
Child Body Mass Index	3.518	0.030
Child Body Mass Index (%)	0.915	0.401
Does child currently have diabetes?	0.142	0.868
Would you describe child's diabetes as mild, moderate, or severe?	0.383	0.694
Does child currently have asthma?	0.102	0.903
Would you describe child's asthma as mild, moderate, or severe?	0.321	0.726
Parent Health Status		
Would you describe your health as excellent, very good, good, fair or poor?	2.465	0.85
Have you ever been told by medical professional that you had hypertension	0.027	0.974
Have you ever been told by medical professional that you had diabetes?	0.392	0.676
Have you ever been told by health professional that you had type 1 child onset or type 2 adult onset diabetes?	0.561	0.571
Is you blood sugar usually under control?	0.803	0.448
Have you smoked at least 100 cigarettes in your life	1.166	0.312
Do you smoke cigarettes every day, some days, or not at all?	0.953	0.385
What are the rules about smoking inside your home?	0.287	0.750